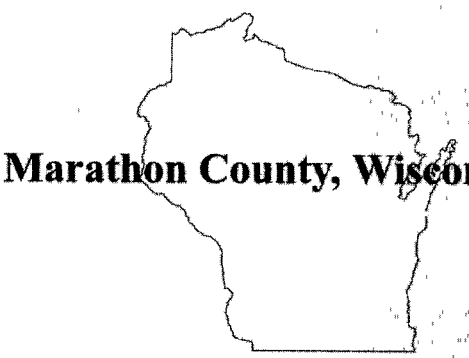
Draft ~~Report~~

WI SPS-8

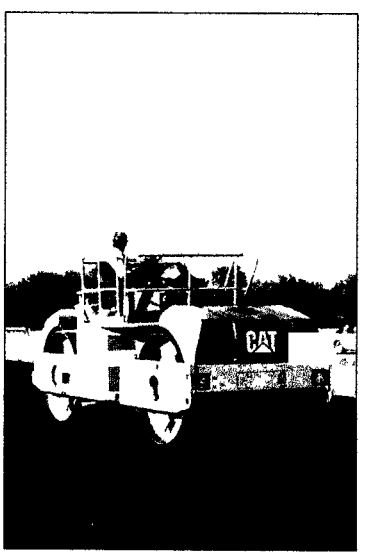
Sampling and Testing Plan

SPS-8 Experimental Project

Apple Lane



Marathon County, Wisconsin



Summer 1997

Prepared by:
SHRP North Central Region

LTPP

DEPARTMENT OF TRANSPORTATION
UNITED STATES OF AMERICA

Submitted by

ERES CONSULTANTS, INC.

SAMPLING AND TESTING PLAN
SPS-8 EXPERIMENTAL PROJECT
APPLE LANE
MARATHON COUNTY, WISCONSIN

Strategic Highway Research Program
Long-Term Pavement Performance
Specific Pavement Studies

Prepared by
ERES Consultants, Inc.
North Central Region Coordination Office (NCRCO)
Updated July 1 , 1997

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.0 INTRODUCTION

The SHRP experimental project SPS-8 studies the environmental effects on pavements in the absence of heavy loads. Two flexible pavement test sections are constructed for this experiment. The two test sections are constructed with different surface course thicknesses and different dense graded aggregate base thicknesses. Field tests are conducted and samples obtained at the two test sections at different stages of construction. The purpose of the sampling and testing activities is to document the conditions of the as-built pavement layers.

An SPS-8 experiment is planned for construction on eastbound Apple Lane, just north of STH 29 in Marathon County, Wisconsin. This document presents the type, number, and locations for the sampling and testing activities at different stages of construction on the two test sections. In addition, it contains details of the laboratory tests to be conducted on the samples. The laboratory tests shall be performed by the Wisconsin DOT laboratory or their designee and the FHWA-LTPP laboratory materials testing contractor. Further details of the SPS-8 experiment, material sampling procedures, and laboratory testing procedures are given in references 1 through 6.

This is a working document. As situations are encountered in the field during construction, it may be necessary to augment parts of this sampling plan. For instance, sampling locations may be moved slightly in either the transverse or longitudinal direction. However, it is essential that any changes made to this plan, even slight ones, be carefully documented for future reference.

2.0 LAYOUT OF TEST SECTIONS

The layout of the two test sections in the SPS-8 experimental project is shown in figure 1. This figure shows the monitoring portion of each test section, which is 500 feet in length. Tables 1 and 2 provide the layering schemes for each test section. Table 3 gives the section limits for the test sections. Each test section includes a monitoring section of 500 feet and 50 feet at each end of the monitoring section for materials sampling. The pavement layer materials and thicknesses for all sections are shown in table 4.

3.0 MATERIALS SAMPLING AND TESTING

Materials sampling and field testing are required at different stages of construction. These activities shall be conducted according to the standards specified or referenced in this document. The standards may be specific to the SHRP-LTPP program or standard

AASHTO/ASTM methods. LTPP sampling and field-testing procedures have been developed specifically for the SHRP program and are described in reference 5. In addition, protocols have been developed by SHRP for conducting laboratory tests. These protocols are documented in Appendix E.2 of the *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing* (reference 4).

In all test sections, sampling and field testing shall commence from the prepared subgrade surface. A summary of the samples to be obtained and field tests to be performed on each layer is described next.

3.1 Subgrade

- Obtain splitspoon samples.
- Conduct moisture and density tests using the nuclear gauge on the prepared subgrade surface.
- Obtain bulk samples and moisture samples from the prepared subgrade surface.
- Conduct elevation measurements on the prepared subgrade surface.

3.2 Aggregate Base

- Conduct moisture and density tests on compacted aggregate base using the nuclear gauge.
- Obtain bulk samples and moisture samples from the compacted aggregate base.
- Conduct elevation measurements on the compacted aggregate base surface.

3.3 Asphalt Concrete (AC)

- Obtain bulk samples of uncompacted asphalt concrete from the paver or haul vehicle immediately prior to laydown. Samples from the intermediate course as well as the surface course are required.
- Obtain bulk samples of asphalt cement used in the production of asphalt concrete from the plant. If more than one asphalt cement type is used, obtain samples from each type.

- Conduct nuclear density tests on compacted asphalt concrete surface using the nuclear gauge. Conduct tests after completion of the intermediate course as well as the surface course.

- Conduct elevation measurements on the prepared asphalt concrete surface.

- Obtain cores from asphalt concrete surface.

The materials sampling requirements for the test sections are summarized in table 5A. Table 5B gives the materials samples required for the SHRP Materials Reference Library (MRL). A summary of the field tests that are to be conducted on each layer is presented in table 6.

The laboratory tests to be conducted on the subgrade, aggregate base, and asphalt concrete materials are given in table 7. This table also gives the SHRP test designations and the SHRP Protocols for all tests.

The detailed plan for sampling and field testing, showing the sampling and field test locations as well as the detailed laboratory testing plan, will be described in the next sections.

4.0 OVERVIEW OF SAMPLING AND TESTING PLAN

Figure 2 gives an overview of the layer types and thickness in all sections. An overview of the sampling and field testing requirements for the different pavement layers for all sections is provided in figures 3 though 5. All sampling and field testing in each layer shall be completed before construction begins on the next layer.

5.0 SAMPLING AND TESTING FOR EACH LAYER

5.1 Introduction

Materials sampling, field tests, and laboratory tests for each pavement layer will be described in this section. Figures 3 through 5 give an overview of sampling and testing on each pavement layer. All sampling and field tests shall be conducted according to the specified standards for sampling and testing. These standards are either AASHTO standards, ASTM standards or methods specific to the SHRP program. All laboratory tests shall be conducted according to protocols developed for SPS experiments that are in Appendix E.2 of the *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing* (reference 4).

The laboratory tests specified in this document shall be conducted by the Wisconsin DOT or a Wisconsin DOT designated laboratory and by the FHWA-LTPP Materials Testing Contractor. Sampling, field testing, and laboratory testing for each layer are described in the next sections. The offsets for sampling and testing locations given in this sampling plan are given with reference to the center line of the pavement.

5.2 Subgrade

5.2.1 Sampling

Bulk samples and moisture samples from the prepared subgrade surface shall be obtained from the test sections at the locations given in table 8. Prior to obtaining bulk samples at these locations, nuclear moisture/density testing must be conducted at the sampling locations. The bulk sampling shall consist of a single excavation, 2 feet by 2 feet in area and 12 inches deep. Approximately 400 pounds of material shall be obtained from each sampling location.

Splitspoon samples shall be obtained from the prepared subgrade surface at the locations shown in table 9. Samples shall be obtained to a depth of 4 feet from the surface. Splitspoon sampling shall be performed using a 140-pound hammer, 30 inch drop and a sampler specified in AASHTO T206. After performing splitspoon sampling, the barrel shall be opened and the recovered material shall be carefully examined and logged to record the length of the recovery and description of the soil. The soil layers should be identified and recorded. If rock, boulders or other forms of dense materials are encountered within four feet of the top of the layer, another attempt for sampling shall be made at a different location with a longitudinal offset of 5 to 10 feet. If refusal occurs at a second location, splitspoon sampling shall be terminated.

5.2.2 Field and Laboratory Tests

A summary of the field and laboratory test plan for the subgrade is shown in table 10. These tables also give the SHRP Protocols that shall be followed when conducting these tests. The applicable procedures outlined in *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing* (reference 4) shall be followed when conducting any laboratory tests.

The following field tests shall be conducted on the prepared subgrade at the test sections.

1. *Density and Moisture Tests.* Locations for in-place density and moisture tests on the prepared subgrade are shown in table 11. The density/moisture measurements shall be made using the direct transmission method for density

and the backscatter method for moisture determination. Density determinations shall be conducted using AASHTO T238-86, "Standard Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth)," Method B - Direct Transmission. Moisture measurements shall be conducted using AASHTO T239-86, "Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depths, Backscatter Method)." For the density test, the rod shall be imbedded 4 to 8 inches below the layer surface as appropriate to test the full layer. At each testing location, four readings of one minute each shall be conducted with the nuclear testing instrument rotated 90° between each reading.

2. *Elevation Measurements.* Elevation measurements shall be performed on the surface of the prepared subgrade at all sections. The elevation measurements shall be conducted at the following locations: (1) five points across the lane, at 50 foot intervals between the beginning and end of the monitoring sections. (2) five points across the lane, at 25 feet prior to the beginning of the monitoring section and 25 feet from the end of the monitoring section. The locations at which the elevation measurements are to be performed at the test sections are given in table 12. Each elevation measurement shall be measured with an accuracy within 0.01 feet.

3. *Auger Probes.* Roadway boring logs have been provided from 1993 that indicate that no rigid layer exists in the area within 20 feet of the surface. Therefore, it has been determined that no shoulder probes will be required for this project.

5.3 Aggregate Base

5.3.1 Sampling

Bulk samples and moisture samples from the compacted aggregate base shall be obtained at the approximate locations shown in table 14. Before obtaining the bulk samples, moisture and density tests using a nuclear gauge shall be performed at the bulk sampling locations. Each bulk sample shall contain 400 pounds of material.

5.3.2 Field and Laboratory Tests

A summary of the field and laboratory tests to be conducted on the aggregate base is shown in table 15. This table also gives the SHRP Protocols that shall be followed when conducting these tests. The applicable procedures outlined in *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing* (reference 5) shall be followed when conducting any laboratory tests.

The following field tests shall be conducted on the prepared aggregate base surface.

1. *In Place Nuclear Density and Moisture Tests.* Nuclear density and moisture tests shall be conducted on the prepared aggregate base at locations specified in table 16. The density/moisture measurements shall be made using the direct transmission method for density and the backscatter method for moisture determination. Density determinations shall be conducted using AASHTO T238-86, "Standard Method for Density of Soil and Soil Aggregate in Place by Nuclear Method (Shallow Depth)," Method B - Direct Transmission. Moisture measurements shall be conducted using AASHTO T239-96, "Moisture Content of Soil and Soil Aggregate in Place by Nuclear Methods (Shallow Depths, Backscatter Method)." For the density test, the rod shall be imbedded 4 to 8 inches below the layer surface as appropriate to test the full layer. At each testing location, four readings of one minute each shall be conducted with the nuclear testing instrument rotated 90° between each reading.

2. *Elevation Measurements.* Elevation measurements shall be performed on the surface of the prepared aggregate base at all test sections at the following locations: (1) five points across the lane, at 50 foot intervals between the beginning and end of the monitoring section. (2) five points across the lane, at 25 feet prior to the beginning of the monitoring section and 25 feet from the end of the monitoring section. The locations at which the elevation measurements shall be performed are given in table 12. Each elevation measurement shall be measured with an accuracy within 0.01 feet.

5.4 Asphalt Concrete (AC)

Two types of asphalt concrete mixes are used on the project. These are HV intermediate (binder) course and HV surface course.

5.4.1 Sampling

Bulk Sampling

Bulk samples of uncompacted asphalt concrete material shall be obtained from the paver or the haul vehicle, from the mix that is to be placed approximately at the locations shown in table 17. At each location, samples shall be obtained from both asphalt concrete mixes (HV binder course and HV surface course). Each asphalt concrete sample shall contain 100 pounds of material. These samples shall be obtained in accordance with AASHTO T168 and shipped to the laboratory.

Asphalt Cement

Three 5-gallon samples of the asphalt cement used in the production of the asphalt concrete shall be obtained from the plant. The sampling schedule and the sample designation for the asphalt cement samples are given in table 17. If different types of asphalt cement are used, three 5-gallon samples shall be obtained from each type of asphalt cement.

Core Samples

Core samples of 4-inch diameter shall be obtained from the compacted asphalt concrete surface at the locations given in table 18. Coring operations shall be performed in accordance with AASHTO T24-86, "Obtaining and Testing Drilled Cores and Sawed Beams of Concrete." Carbide or diamond bit drilling is to be performed. Mist or air-cooled drilling is preferred as the best method to minimize water contamination of the underlying layers. If necessary, to obtain cores of suitable quality, the pavement may be cooled by dry-ice or other means prior to coring. Cores which have multiple layers of asphalt concrete shall not be separated in the field. Plugs shall not be inserted in cores. Suction cups or wire pulls have been successfully used for core extraction. Care shall be taken to obtain cores at a 90-degree angle to the pavement surface and that the edges are straight, intact, smooth and suitable for laboratory testing. Details on tolerance and Quality Control of the cores are included in section 3.3.6 of reference 6. The direction of traffic shall be marked on all cores using a waterproof marking material. All cores must be dried before packaging.

5.4.2 Field and Laboratory Testing

The field tests to be conducted on the compacted asphalt concrete surface as well as laboratory tests to be conducted on the uncompacted material and cores of asphalt concrete are shown in table 19. If samples from more than one type of asphalt cement were obtained, all tests specified for asphalt cement from plant in table 19 shall be conducted on the different types of asphalt cement. This table also gives the SHRP Protocols that are to be followed when conducting these tests. The applicable procedures outlined in *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing* (reference 4) shall be followed when conducting any laboratory tests. The following field tests are to be conducted on the prepared asphalt concrete surface.

1. *Nuclear Density Tests.* The locations for nuclear density tests are specified in table 20. Nuclear density tests shall be conducted after the completion of the intermediate course and after completion of the surface course. The density testing shall be performed at the specified locations using AASHTO T238-86,

backscatter mode. Each testing location shall have four readings with the density instrument rotated 90 degrees between each reading.

2. *Elevation Measurements.* Elevation measurements are to be performed after the completion of the surface course. Elevation measurements shall be performed on the surface of the finished asphalt concrete surface at both flexible pavement sections at the following locations: (1) five points across the lane at 50 foot intervals between the beginning and end of the monitoring section. (2) five points across the lane at 25 feet prior to the beginning of the monitoring section and 25 feet from the end of the monitoring section. The locations at which the elevation measurements are to be performed are given in table 12. Each elevation measurement shall be measured with an accuracy within 0.01 feet.

6.0 LOGS AND REPORTS

During field sampling operations, two types of forms must be completed. These are the Field Operations Information Forms and the Sampling Data Sheets. Field Operations Information Forms are used to record general information concerning the pavement test sections and the materials samples. Sampling Data Sheets are used to record the actual information for each sampling area or sampling location. If these forms are completed by a person other than the LTPP representative, the data must be reviewed by the LTPP representative prior to forwarding the sheets to the appropriate personnel. Further details regarding logs and reports are contained in section 3.2.8 and 3.2.9 in reference 2. Details on assembly and transmittal of data sheets are described in section 3.2.10 through 3.2.14 in reference 2.

7.0 HANDLING AND SHIPPING OF SAMPLES

Because of the research nature of this project and because samples will be shipped over long distances, it is extremely important that the samples be packaged carefully. Sections 3.2.11 and 3.2.12 in reference 2 give detailed guidelines on packaging and shipping of samples.

8.0 SAMPLE STORAGE

The guidelines for storing samples that are described for the SPS-1 experiment (reference 6) should be followed when storing samples obtained from the SPS-8 experiment.

9.0 LABORATORY TESTING

Procedures to be followed in laboratory testing for the SPS-1 experiment (reference 6) are applicable to the SPS-8 experiment. The *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing* (reference 4) gives the protocols for laboratory testing.

10.0 DOCUMENTATION

An extensive amount of documentation is required for SPS projects. It is essential that the State assign a person full-time who will be in charge of completing all necessary documentation for this project. This includes documentation related to inventory, construction, sampling, field testing, and laboratory testing.

11.0 REFERENCES

1. *Specific Pavement Studies, Construction Guidelines for Experiment SPS-8, Study of Environmental Effects in the Absence of Heavy Loads*, Strategic Highway Research Program, Operational Memorandum No. SHRP-LTPP-OM-029, March 1992.

2. *Specific Pavement Studies, Materials Sampling and Testing Requirements for Experiment SPS-8, Study of Environmental Effects in the Absence of Heavy Loads*, Operational Memorandum No. SHRP-LTPP-OM-030, August 1992.

3. *Specific Pavement Studies, Data Collection Guidelines for Experiment SPS-8, Study of Environmental Effects in the Absence of Heavy Loads*, Operational Memorandum No. SHRP-LTPP-OM-031, September 1992.

4. *SHRP-LTPP Interim Guide for Laboratory Material Handling and Testing (PCC, Bituminous Materials, Aggregates and Soils)*, Operational Guide No. SHRP-LTPP-OG-004, Strategic Highway Research Program, Revised and Amended, July 1993.

5. *SHRP-LTPP Guide for Field Materials Sampling, Testing and Handling, Version 2.0*, Operational Guide No. SHRP-LTPP-OG-006, Strategic Highway Research Program, Revised October, 1992.

6. *Specific Pavement Studies, Materials Sampling and Testing Requirements for Experiment SPS-1, Strategic Study of Structural Factors for Flexible Pavements*, Federal Highway Administration, LTPP Division, January 1994.

Appendix A

Figures

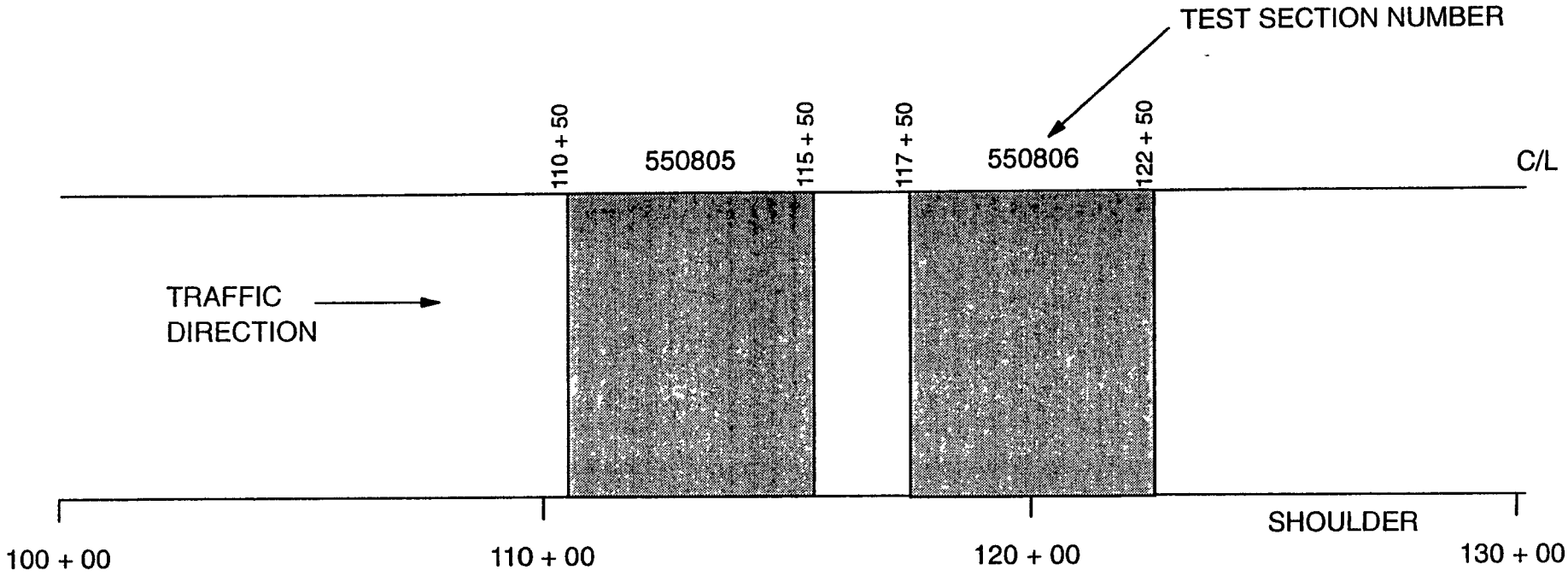


Figure 1. Layout of Test Sections.

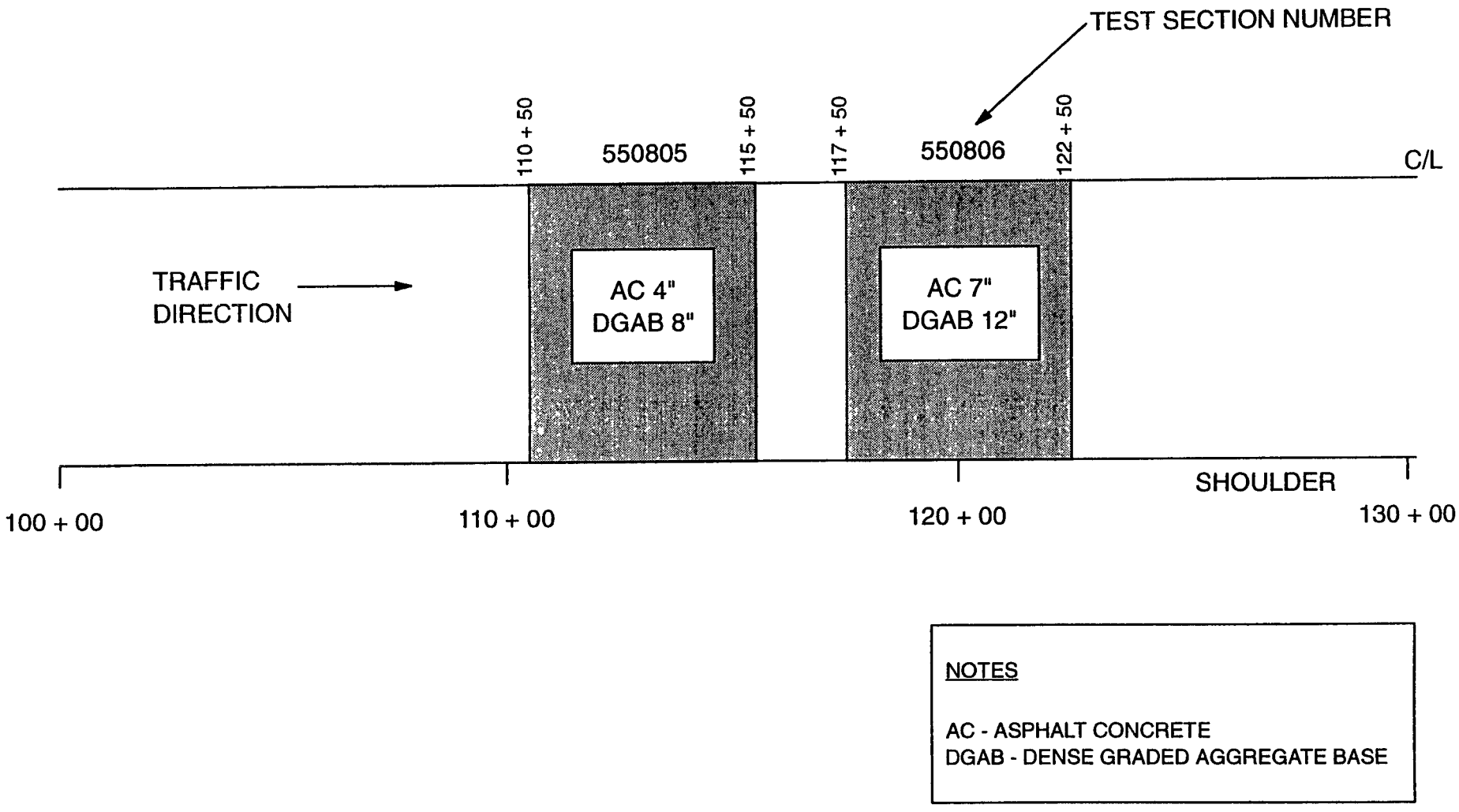


Figure 2. Design Features of Test Sections.

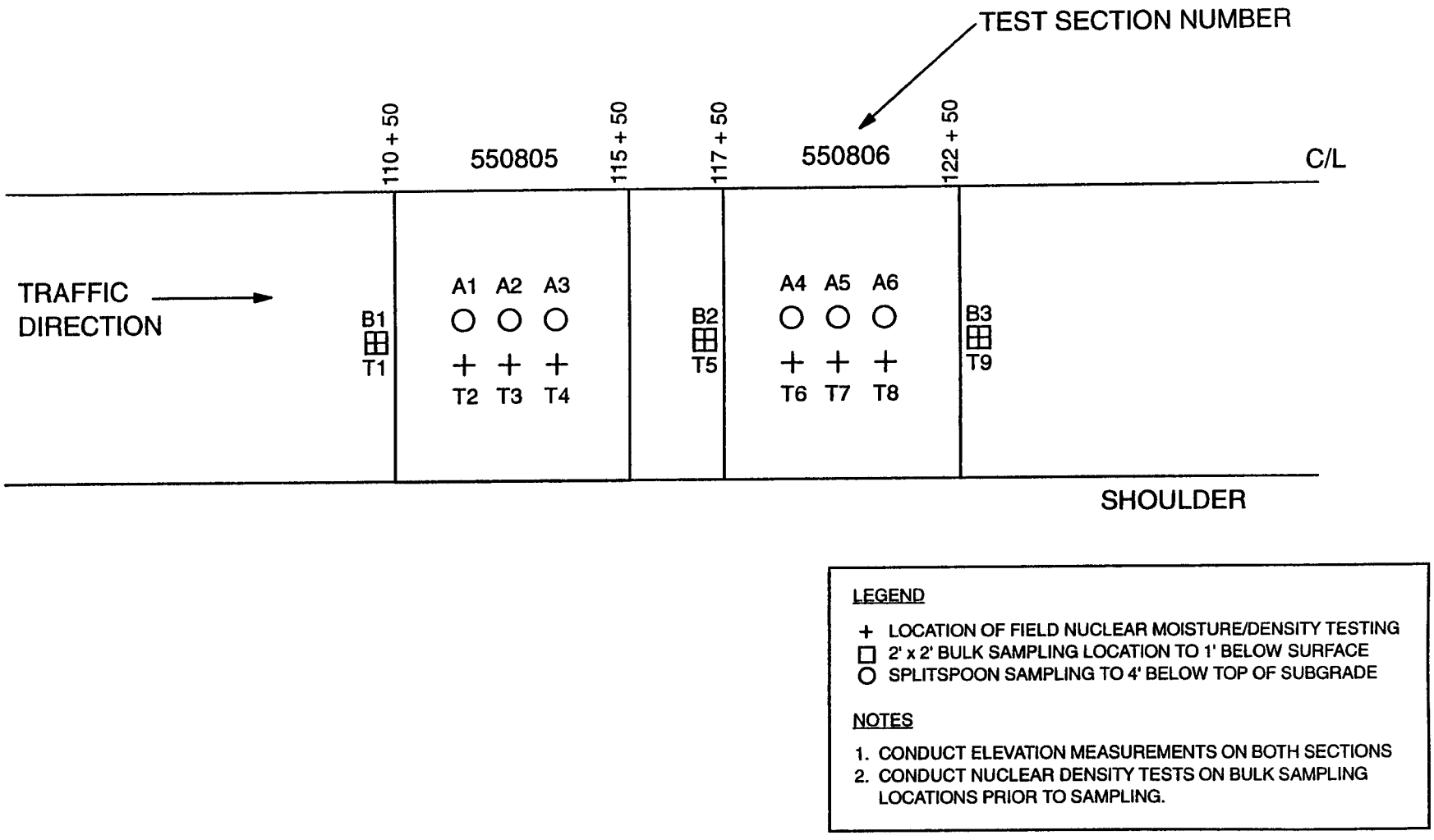


Figure 3. Overview of Sampling and Testing Plan for Subgrade.

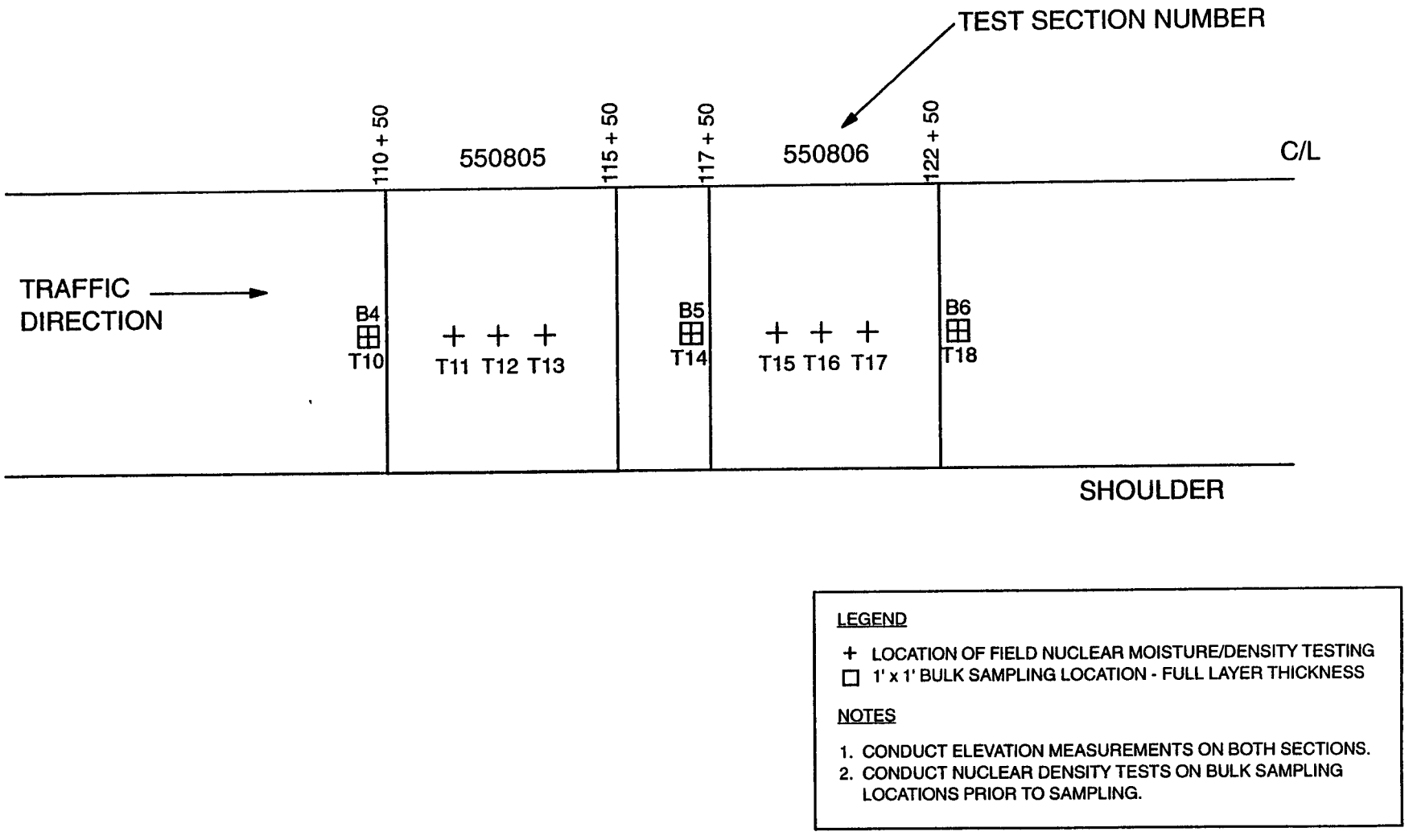


Figure 4. Overview of Sampling and Testing Plan for DGAB.

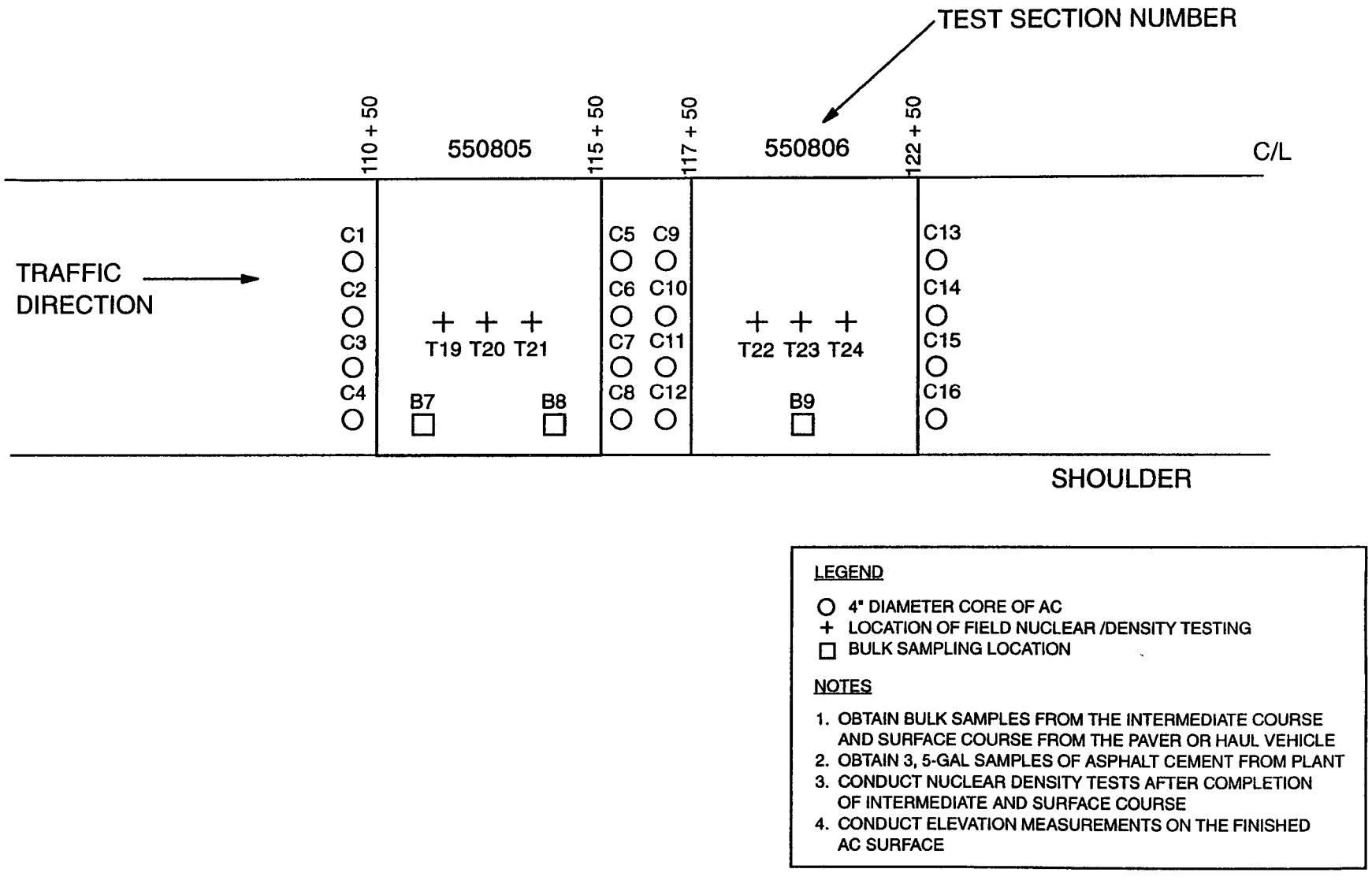


Figure 5. Overview of Sampling and Testing Plan for Asphalt Concrete.

Appendix B

Tables

Table 1. Layer Coding - SPS-8.

Project Layer Code	Material Code	Comments
A	59	Subgrade
B	23	Dense Graded Aggregate Base
C	01	Asphalt Concrete - HV Binder
D	01	Asphalt Concrete - HV Surface

Table 2. Test Section Layer Numbering - SPS-8.

Test Section	Layer Number	Project Layer Code	Layer Thickness (in)	Material Code	Comments
550805	1	A	N/A	59	Subgrade
	2	B	8	23	DGAB
	3	C	2.25	01	AC Binder
	4	D	1.75	01	AC Surface

Test Section	Layer Number	Project Layer Code	Layer Thickness	Material Code	Comments
550806	1	A	N/A	59	Subgrade
	2	B	12	23	DGAB
	3	C	5.5	01	AC Binder
	4	D	1.5	01	AC Surface

Table 3. Limits of Test Sections - SPS-8.

Section Number	600 ft. SHRP Section		500 ft. Monitoring Section	
	Beginning	End	Beginning	End
550805	110 + 00	116 + 00	110 + 50	115 + 50
550806	117 + 00	123 + 00	117 + 50	122 + 50

Table 4. Design Features of Test Sections - SPS-8.

Test Section	Layer Types and Thicknesses (in)	
	Layer 1	Layer 2
550805	AC 4	DGAB 8
550806	AC 7	DGAB 12

AC - Asphalt Concrete
DGAB - Dense Graded Aggregate Base

Table 5A. Materials Sampling Requirements - SPS-8.

Material Sample	Number of Samples	Sample Locations
SUBGRADE		
Bulk samples from compacted surface	3	B1-B3
Moisture Content Samples	3	B1-B3
Splitspoon Samples (3 spoons per hole)	6 locations (18 tubes)	A1-A6
DENSE GRADED AGGREGATE BASE		
Bulk Samples from compacted surface	3	B4-B6
Moisture Content Samples	3	B4-B6
ASPHALT CONCRETE		
Cores - 4 inch diameter	16	C1-C16
Bulk Samples from uncompacted surface, 100 lb. per sample		
Surface course	3	B7-B9
Intermediate course	3	B7-B9
Asphalt Cement used for Asphalt Concrete - 5 gal. samples	3	B7-B9 (plant)

Table 5B. Samples for Materials Reference Library - SPS-8

Asphalt Cement - Three 5-gallon samples of each type of asphalt cement used in the project

Graded Coarse and Fine Aggregate - One 55-gallon drum of the graded coarse and fine aggregate used for the following mixes.

Asphalt Concrete - Intermediate Course

Asphalt Concrete - Surface Course

Uncompacted Asphalt Mix - Three 5-gallon pails of the uncompacted mix from each of the following:

Asphalt Concrete - Intermediate Course

Asphalt Concrete - Surface Course

Table 6 Summary of Field Tests for Each Layer - SPS-8.

Layer Type and Field Test	Total Tests	SHRP Protocol
SUBGRADE - 2 Sections		
Density and Moisture Tests (Nuclear Gauge)	9	Section 3.3.14, Reference 6
Elevation Measurements (65 per section)	130	Reference 1
AGGREGATE BASE - 2 Sections		
Density and Moisture Tests (Nuclear Gauge)	9	Section 3.3.14, Reference 6
Elevation Measurements (65 per section)	130	Reference 1
ASPHALT SURFACE - 2 Sections		
Density Tests:		Section 3.3.14, Reference 7
Intermediate Course	6	
Surface Course	6	
Elevation Measurements (65 per section)	130	Reference 1

Table 7. Laboratory Test Plan for Each Layer - SPS-8.

Test	SHRP Test Designation	SHRP Protocol	No. of Tests	Test Conducted by: State	Test Conducted by: FHWA
SUBGRADE					
Sieve Analysis	SS01	P51	3	-	X
Hydrometer to 0 001mm	SS02	P42	3	-	X
Atterberg Limits	SS03	P43	3	-	X
Classification - Bulk Samples	SS04	P52	3	-	X
Classification - Spoons (visual manual only)	SS04	P52	6	X	X
Moisture - Density Relations	SS05	P55	3	-	X
Resilient Modulus (bulk samples)	SS07	P46	3	-	X
Natural Moisture Content	SS09	P49	3	-	X
Permeability (bulk samples)	UG09	P48	3	X	-
AGGREGATE BASE					
Particle Size Analysis	UG01	P41	3	-	X
Sieve Analysis (washed)	UG02	P41	3	-	X
Atterberg Limits	UG04	P43	3	-	X
Moisture - Density Relations	UG05	P44	3	-	X
Resilient Modulus	UG07	P46	3	-	X
Classification	UG08	P47	3	-	X
Permeability	UG09	P48	3	X	-
Natural Moisture Content	UG10	P49	3	-	X
ASPHALT CONCRETE (SURFACE AND INTERMEDIATE COURSE)					
Core Examination/Thickness	AC01	P01	16	X	X
Bulk Specific Gravity	AC02	P02	32	X	X
Maximum Specific Gravity	AC03	P03	6	X	-
Asphalt Content (Extraction)	AC04	P04	6	X	-
Moisture Susceptibility	AC05	P05	6	X	-
Creep Compliance	AC06	P06	2	-	X
Resilient Modulus	AC07	P07	18	-	X
Tensile Strength	AC07	P07	24	-	X

Table 7 Laboratory Test Plan for Each Layer - SPS-8 (continued)

Test	SHRP Test Designation	SHRP Protocol	No. of Tests	Test Conducted by:	
				State	FHWA
ASPHALT CEMENT (EXTRACTED)					
Abson Recovery	AE01	P21	6	X	-
Penetration at 77F and 115F	AE02	P22	6	X	-
Specific Gravity (60F)	AE03	P23	6	X	-
Viscosity at 77F	AE04	P24	6	X	-
Viscosity at 140F, 275F	AE05	P25	6	X	-
EXTRACTED AGGREGATE					
Specific Gravity - Coarse Aggregate	AG01	P11	6	X	-
Specific Gravity - Fine Aggregate	AG02	P12	6	X	-
Gradation of Aggregate	AG04	P14	6	X	-
NAA Test for Fine Aggregate	AG05	P14A	6	X	-
ASPHALT CEMENT (FROM TANKER)					
Penetration at 77F, 115F	AE02	P22	3	X	-
Specific Gravity (60F)	AE03	P23	3	X	-
Viscosity at 77F	AE04	P24	3	X	-
Viscosity at 140F, 275F	AE04	P25	3	X	-

Table 8. Locations for Bulk Samples and Moisture Samples from Prepared Subgrade - SPS-8.

Testing Location	Sample Designations	Reference Monitoring Section	Sampling Location	Offset from Center Line of Pavement (ft)
B1	BS01, MS01	550805	110 + 25	6
B2	BS02, MS02	550806	117 + 25	6
B3	BS03, MS03	550806	122 + 75	6
NOTE: Perform nuclear moisture and density tests at these locations before obtaining bulk samples.				

Table 9 Locations for Splitspoon Sampling from Subgrade - SPS-8.

Testing Location	Sample Designation	Reference Monitoring Section	Sampling Location	Offset from Center Line of Pavement (ft)
A1	TS01	550805	111 + 50	4
A1	TS02	550805	111 + 50	4
A1	TS03	550805	111 + 50	4
A2	TS04	550805	113 + 00	4
A2	TS05	550805	113 + 00	4
A2	TS06	550805	113 + 00	4
A3	TS07	550805	114 + 50	4
A3	TS08	550805	114 + 50	4
A3	TS09	550805	114 + 50	4
A4	TS10	550806	118 + 50	4
A4	TS11	550806	118 + 50	4
A4	TS12	550806	118 + 50	4
A5	TS13	550806	120 + 00	4
A5	TS14	550806	120 + 00	4
A5	TS15	550806	120 + 00	4
A6	TS16	550806	121 + 50	4
A6	TS17	550806	121 + 50	4
A6	TS18	550806	121 + 50	4

Table 10 Field and Laboratory Test Plan for Subgrade - SPS-8.

Test	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source/ Test Location	Test Conducted by	
					State	FHWA
FIELD TESTS						
In-Place Density & Moisture	-	Section 3 3 14 Reference 6	9	T1 - T9	X	-
Elevation Measurements		Ref 1	65 per Section	Section 5 2.2 and Table 12 of this report	X	-
LABORATORY TESTS						
Sieve Analysis	SS01	P51	3	B1 - B3	-	X
Hydrometer to 0 001mm	SS02	P42	3	B1 - B3	-	X
Atterberg Limits	SS03	P43	3	B1 - B3	-	X
Classification (NOTE 1)	SS04	P52	3	B1 - B3	-	X
			6	A1 - A6	X	X
Moisture-Density Relations	SS05	P55	3	B1 - B3	-	X
Resilient Modulus	SS07	P46	3	B1 - B3	-	X
Natural Moisture Content	SS09	P49	3	B1 - B3	-	X
Permeability	UG09	P48	3	B1 - B3	X	-

NOTE 1: Visual-manual classification only.

Table 11 Locations for In-place Density and Moisture Tests on Prepared Subgrade - SPS-8.

Test Location Designation	Reference Monitoring Section	Test Location	Offset from Center Line of Pavement (ft)
T1*	550805	110 + 25	6
T2	550805	111 + 50	8
T3	550805	113 + 00	8
T4	550805	114 + 50	8
T5*	550806	117 + 25	6
T6	550806	118 + 50	8
T7	550806	120 + 00	8
T8	550806	121 + 50	8
T9*	550806	122 + 75	6

NOTE: * - Bulk sampling locations. Perform nuclear density tests at these locations before obtaining bulk samples.

Table 12. Locations for Elevations Measurements - SPS-8.

Section Number	Station	Distance from Center Line of Pavement (feet)				
550805	110 + 25	0	3	6	9	12
	110 + 50	0	3	6	9	12
	111 + 00	0	3	6	9	12
	111 + 50	0	3	6	9	12
	112 + 00	0	3	6	9	12
	112 + 50	0	3	6	9	12
	113 + 00	0	3	6	9	12
	113 + 50	0	3	6	9	12
	114 + 00	0	3	6	9	12
	114 + 50	0	3	6	9	12
	115 + 00	0	3	6	9	12
	115 + 50	0	3	6	9	12
	115 + 75	0	3	6	9	12
550806	117 + 25	0	3	6	9	12
	117 + 50	0	3	6	9	12
	118 + 00	0	3	6	9	12
	118 + 50	0	3	6	9	12
	119 + 00	0	3	6	9	12
	119 + 50	0	3	6	9	12
	120 + 00	0	3	6	9	12
	120 + 50	0	3	6	9	12
	121 + 00	0	3	6	9	12
	121 + 50	0	3	6	9	12
	122 + 00	0	3	6	9	12
	122 + 50	0	3	6	9	12
	122 + 75	0	3	6	9	12

Table 13. Locations for FWD Tests - SPS-8

Section Number	Locations for FWD Tests Distance from Center Line of Pavement	
	9.5 +/- 0.5 ft. (Outer Wheel Path)	6.0 +/- 0 5 ft. (Mid lane)
550805	110 + 25	110 + 25
	110 + 50	110 + 75
	111 + 00	111 + 25
	111 + 50	111 + 75
	112 + 00	112 + 25
	112 + 50	112 + 75
	113 + 00	113 + 25
	113 + 50	113 + 75
	114 + 00	114 + 25
	114 + 50	114 + 75
	115 + 00	115 + 25
	115 + 50	115 + 75
	115 + 75	-
550806	117 + 25	117 + 25
	117 + 50	117 + 75
	118 + 00	118 + 25
	118 + 50	118 + 75
	119 + 00	119 + 25
	119 + 50	119 + 75
	120 + 00	120 + 25
	120 + 50	120 + 75
	121 + 00	121 + 25
	121 + 50	121 + 75
	122 + 00	122 + 25
	122 + 50	122 + 75
	122 + 75	-

Table 14. Locations for Bulk Samples and Moisture Samples from Prepared Aggregate Base - SPS-8.

Testing Location	Sample Designation	Reference Monitoring Section	Sampling Location	Offset from Center Line of Pavement (ft)
B4	BG01, MG01	550805	110 + 25	6
B5	BG02, MG02	550806	117 + 25	6
B6	BG03, MG03	550806	122 + 75	6
NOTE: Perform nuclear moisture and density tests at these locations before obtaining bulk samples.				

Table 15. Field and Laboratory Test Plan for Aggregate Base - SPS-8.

Test	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source/ Test Location	Test Conducted by	
					State	FHWA
FIELD TESTS						
In-Place Density & Moisture	-	Section 3.3 14 Reference 6	9	T10 - T18	X	-
Elevation Measurements	-	Ref 1	65 per Section	Section 5 3.2 and Table 12 of this report	X	-
LABORATORY TESTS						
Particle Size Analysis	UG01	P41	3	B4 - B6	-	X
Sieve Analysis (washed)	UG02	P41	3	B4 - B6	-	X
Atterberg Limits	UG04	P43	3	B4 - B6	-	X
Moisture-Density Relations	UG05	P44	3	B4 - B6	-	X
Resilient Modulus	UG07	P46	3	B4 - B6	-	X
Classification	UG08	P47	3	B4 - B6	-	X
Permeability	UG09	P48	3	B4 - B6	X	-
Natural Moisture Content	UG10	P49	3	B4 - B6	-	X

Table 16. Locations for In-place Density and Moisture Tests on Compacted Aggregate Base - SPS-8.

Test Location Designation	Reference Monitoring Section	Test Location	Offset from Center Line of Pavement (ft)
T10*	550805	110 + 25	6
T11	550805	111 + 50	6
T12	550805	113 + 00	6
T13	550805	114 + 50	6
T14*	550806	117 + 25	6
T15	550806	118 + 50	6
T16	550806	120 + 00	6
T17	550806	121 + 50	6
T18*	550806	122 + 75	6

NOTE: * - Bulk and moisture sampling locations. Perform nuclear moisture and density tests before obtaining samples.

Table 17 Locations for Bulk Sampling of Asphalt Concrete and Asphalt Cement - SPS-8.

Asphalt Concrete Sampling Location (Note 1)	Sampling Location Station	Reference Monitoring Section	Bulk Asphalt Concrete Sample Designation (NOTE 1)	Asphalt Cement Sample Designation (NOTE 2)
B7	111 + 00	550805	BA01, BA20	BC01
B8	115 + 00	550805	BA02, BA21	BC02
B9	120 + 00	550806	BA03, BA22	BC03

NOTE 1 Take samples of uncompacted asphalt concrete from the haul vehicle or paver for the mix to be placed at the given locations. Samples shall be obtained from the intermediate course and the surface course at the specified locations. Samples from the intermediate course shall be assigned sample numbers BA01, BA02, and BA03, and samples from the surface course assigned numbers BA20, BA21, and BA22.

NOTE 2 Obtain from the plant a 5-gallon sample of asphalt cement used in the asphalt concrete mix that is placed at the specified location.

Table 18. Locations for Asphalt Concrete Cores - SPS-8.

Reference Monitoring Section	Core Location	Core Number	Offset from Center Line of Pavement (ft)
550805	110 + 25	C1	5.5
		C2	7.0
		C3	8.5
		C4	10.0
	115 + 75	C5	5.5
		C6	7.0
		C7	8.5
		C8	10.0
550806	117 + 25	C9	5.5
		C10	7.0
		C11	8.5
		C12	10.0
	122 + 75	C13	5.5
		C14	7.0
		C15	8.5
		C16	10.0

Table 19 Field and Laboratory Test Plan for Asphalt Concrete - SPS-8.

Test	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source/ Test Location	Test Conducted by	
					State	FHWA
FIELD TESTS						
Nuclear Density Tests	-	Section 3 3 14 Reference 6	6 per course	T19 - T24	X	-
Elevation Measurements	-	Ref 1	65 per Section	See Section 5 4 2 and table 12 of this report	X	-
LABORATORY TESTS						
Asphalt Concrete Surface and Binder						
Core Examination/Thickness	AC01	P01	16	C1 - C16	X	X
Bulk Specific Gravity	AC02	P02	32	C1 - C16 (When the cores are sawed to separate intermediate and surface course there will be 32 samples)	X	X
Maximum Specific Gravity	AC03	P03	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Asphalt Content (Extraction)	AC04	P04	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Moisture Susceptibility	AC05	P05	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Creep Modulus (NOTE 1)	AC06	P06	2	C9I, C9S	-	X
Resilient Modulus (NOTE 1)	AC07	P07	18	C1I, C1S, C2I, C2S, C3I, C3S, C5I, C5S, C6I, C6S, C7I, C7S, C13I, C13S, C14I, C14S, C15I, C15S	-	X
Tensile Strength (NOTE 1)	AC07	P07	24	C1I, C1S, C2I, C2S, C3I, C3S, C4I, C4S, C5I, C5S, C6I, C6S, C7I, C7S, C8I, C8S, C13I, C13S, C14I, C14S, C15I, C15S, C16I, C16S	-	X
Extracted Aggregate						
Specific Gravity - Coarse Agg.	AG01	P11	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Specific Gravity - Fine Agg	AG02	P12	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Gradation of Aggregate	AG04	P14	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
NAA Test for Fine Aggregate	AG05	P14A	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-

Table 19. Field and Laboratory Test Plan for Asphalt Concrete - SPS-8 (continued).

Test	SHRP Test Designation	SHRP Protocol	Number of Tests	Material Source/ Test Location	Test Conducted by	
					State	FHWA
Asphalt Cement (Recovered and Extracted)						
Abson Recovery	AE01	P21	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Penetration at 77F, 115F	AE02	P22	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Specific Gravity (60F)	AE03	P23	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Viscosity at 77F	AE04	P24	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Viscosity at 140F, 275F	AE05	P25	6	BA01, BA02, BA03, BA20, BA21, BA22 - NOTE 2	X	-
Asphalt Cement (From Plant)						
Penetration at 77F, 115F	AE02	P22	3	BC01 - BC03	X	-
Specific Gravity (60F)	AE03	P23	3	BC01 - BC03	X	-
Viscosity at 77F	AE04	P24	3	BC01 - BC03	X	-
Viscosity at 140F, 275F	AE05	P25	3	BC01 - BC03	X	-

NOTE 1: Each asphalt concrete core contains two different layers (intermediate course and surface course)
The last digit of core designation refers to these layers. "I" is for intermediate course and "S" is for surface course.

NOTE 2: Samples BA01, BA02, and BA03 are taken from the intermediate course, while samples
BA20, BA21, and BA22 are taken from the surface course.

Table 20. Locations for Nuclear Density Tests on Asphalt Concrete - SPS-8.

Test Designation	Monitoring Section	Test Location	Offset from Center Line of Pavement (ft)
T19	550805	111 + 50	6
T20	550805	113 + 00	6
T21	550805	114 + 50	6
T22	550806	118 + 50	6
T23	550806	120 + 00	6
T24	550806	121 + 50	6

NOTE: Perform tests after completion of the intermediate course and the surface course.